

CLAIMS

1. A vehicle occupant restraint system for restraining a lower part of a vehicle occupant, comprising:

5 a restraining member supported by a seat frame so as to be moveable between a retracted position leaving a seat bottom in an undisturbed state and a deployed position for restraining a lower part of a vehicle occupant by projecting a part of said seat bottom upward from a normal surface of said seat bottom;

a crash sensor for detecting and/or predicting an occurrence of a vehicle crash;

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a power actuator for moving said restraining member from said retracted position to said deployed position via a power transmitting member upon detection and/or prediction of a vehicle crash by said crash sensor in such a manner that said restraining member cannot be made to move from said deployed position to said 15 retracted position by an external force applied to said restraining member but can be made to move from said retracted position to said deployed position and from said deployed position back to said retracted position by a force transmitted from said power actuator to said restraining member via said power transmitting member.

20 2. A vehicle occupant restraint system according to claim 1, wherein said crash sensor comprises a crash prediction sensor and a control unit for predicting an occurrence of a vehicle crash from an output of said crash prediction sensor, and said control unit is adapted to actuate said power actuator so as to raise said restraining member to an at least partly deployed position.

3. A vehicle occupant restraint system according to claim 2, wherein said crash sensor additionally comprises a simple crash sensor for detecting an actual occurrence of a vehicle crash, and said control unit is adapted to actuate said power actuator so as to raise said restraining member to said partly deployed position according to an output 5 of said crash prediction sensor and to raise said restraining member to said fully deployed position according to an output of said simple crash sensor.
4. A vehicle occupant restraint system according to claim 2, wherein said restraining member comprises a laterally extending member located under said seat 10 bottom at a substantially longitudinally middle point of said seat bottom, and a pair of arms pivotally supporting said laterally extending member with respect to a seat frame.
5. A vehicle occupant restraint system according to claim 4, wherein said power transmitting member comprises a threaded rod extending in a fore-and-aft direction and 15 rotatably supported by a moveable member which is guided by said seat frame so as to be moveable in a fore-and-aft direction, and a nut fixedly attached to said seat frame and threadably engaging said threaded rod, said arms being pivotally supported by said movable member and being provided with an arcuate slot receiving a pin fixedly attached to said seat frame.
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6. A vehicle occupant restraint system according to claim 5, wherein said power actuator comprises an electric motor having an output shaft extending laterally under said seat bottom, and said moveable member comprises a gear box for transmitting a rotation of said output shaft to said threaded rod.

7. A vehicle occupant restraint system according to claim 1, wherein said power transmitting member comprises a threaded rod and a nut threadably engaging said threaded rod, and said power actuator comprises an electric motor for turning one of said threaded rod and nut, the other of said threaded rod and nut being drivingly connected to said restraining member.
8. A vehicle occupant restraint system according to claim 7, wherein said threaded rod is connected to said restraining member, and said power actuator comprises a pyrotechnical actuator which is adapted to move said threaded rod in a direction to deploy said restraining member while said electric motor is adapted to turn said threaded rod,
- said nut comprising a split piece which is normally urged by a spring member against a slanted surface of a guide member in such a manner that said nut is normally placed in a threadable engagement with said threaded rod when said threaded rod is turned in a normal direction to move said restraining member toward said deployed position and is allowed to move freely with respect to said threaded rod when said threaded rod is actuated by said pyrotechnical actuator in said direction to deploy said restraining member.